

USSN 10/625,322
Docket No. 2003B067

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Amendment to the Specification

Please replace paragraph [0002] with the following paragraph:

[0002] Diffusionally modified catalysts find use in many shape-selective, hydrocarbon processing applications. The selectivity to more desirable products (and ultimate product slate) can be modified with diffusionally restricted catalysts. Mass transport selectivity arises from a large difference in the diffusivity of the participating molecules in the zeolite channels, while transition state selectivity results from steric constraints limiting the possible transition state of the catalytic transformation step. The advantages of diffusionally modified catalysts are especially useful in certain petroleum/petrochemical industry processes including catalytic dewaxing, olefin alkylation, shape-selective cracking and aromatic conversion processes such as aromatics disproportionation, e.g., toluene disproportionation, aromatics isomerization, e.g., xylene isomerization, and para-selective aromatics alkylation. The optimum level of acidity for these reactions can vary substantially. For selective aromatics disproportionation processes, e.g., toluene disproportionation processes, a high acid level (700 alpha) can produce a high value product slate. Selective ethylbenzene conversion processes are optimized by a medium acidity level (~50 to 150 alpha), while dewaxing and para-selective aromatics alkylation processes prefer lower acid activities (~5 to 25 alpha).

Please replace paragraph [0016] with the following paragraph:

[0016] The alpha value of a catalyst is an approximate indication of the catalytic cracking activity of the catalyst compared to a standard catalyst, and it gives the relative rate constant (rate of normal hexane conversion per volume of catalyst per unit time). It is based on the activity of the amorphous silica-alumina cracking catalyst taken as an alpha of 1 (Rate Constant = 0.016 sec⁻¹). The alpha test is described in U.S. Pat. No. 3,354,078 and in the Journal of Catalysis, 4, 522-

Page 2 of 11

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USSN 10/625,322
Docket No. 2003B067

529 (1965); 6, 278 (1966); and 61, 395 (1980), each incorporated herein by reference as to that description. It is noted that intrinsic rate constants for many acid-catalyzed reactions are proportional to the alpha value for a particular crystalline silicate catalyst (see The Active Site of Acidic Aluminosilicate Catalysts, Nature, Vol. 309, No. 5959, 589-591, (1984)). The experimental conditions of the test used herein include a constant temperature of 538°C. and a variable flow rate as described in detail in the Journal of Catalysis, 61, 395 (1980). The catalysts employed in the process of the present invention can have an alpha value less than 700, preferably 25 to 200, say, 75 to 150, 5 to 25 (for lower acid activity processes such as aromatics alkylation), and a silica-alumina ratio less than 100, preferably 20-80. The alpha value of the catalyst may be increased by initially treating the catalyst with nitric acid or by mild steaming before selectivation as discussed in U.S. Pat. No. 4,326,994. Generally, the present invention relates to reducing the alpha value of catalyst as prepared to tailor it to the specific application in which it is to be used, without significantly reducing the diffusional barrier of the catalyst (say, by more than 5 or 10%). Indeed, in most instances, alpha value is reduced while actually increasing the diffusional barrier. This represents a significant improvement in controlling catalyst selectivity and activity inasmuch as steaming to reduce alpha value significantly reduces the diffusional barrier.

Please replace paragraph [0021] with the following paragraph:

[0021] The hydrogenation component may be incorporated into the catalyst by methods known in the art, such as ion exchange, impregnation or physical admixture. For example, solutions of appropriate metal salts may be contacted with the remaining catalyst components, either before or after selectivation of the catalyst, under conditions sufficient to combine the respective components. The metal-containing salt may be water soluble. Examples of such salts include chloroplatinic acid, tetraamineplatinum complexes, platinum chloride, tin sulfate and tin chloride. The metal may be incorporated in the form of a cationic, anionic

USSN 10/625,322
Docket No. 2003B067

or neutral complex and cationic complexes such as $\text{Pt}(\text{NH}_3)_4^{2+}$ of this type will be found convenient for exchanging metals onto the zeolite. For example, a platinum modified catalyst can be prepared by first adding the catalyst to a solution of ammonium nitrate in order to convert the catalyst to the ammonium form. The catalyst is subsequently contacted with an aqueous solution of tetraamine platinum(II) nitrate or tetraamine platinum(II) chloride. Anionic complexes such as the vanadate or metatungstate ions are also useful for impregnating metals into the zeolites. Incorporation may be undertaken in accordance with the invention of U.S. Pat. No. 4,312,790, incorporated by reference herein. After incorporation of the metal, the catalyst can then be filtered, washed with water and calcined at temperatures of from about 250°C to about 500°C.

Please replace paragraph [0042] with the following paragraph:

[0042] Zeolites modified in accordance with the invention are generally useful as catalysts in shape selective hydrocarbon conversion processes including cracking reactions, including those involving dewaxing of hydrocarbon feedstocks; isomerization of alkylaromatics, e.g., xylene isomerization; oligomerization of olefins to form gasoline, distillate, lube oils or chemicals; alkylation of aromatics; transalkylation of aromatics, e.g. toluene disproportionation; conversion of oxygenates to hydrocarbons; rearrangement of oxygenates; and conversion of light paraffins and olefins to aromatics, e.g., naphtha reforming. Non-limiting examples include: cracking hydrocarbons with reaction conditions including a temperature of from about 300°C to about 700°C, a pressure of from about 0.1 atmosphere to about 30 atmospheres and weight hourly space velocity of from about 0.1 hr^{-1} to about 20 hr^{-1} ; dehydrogenating hydrocarbon compounds with reaction conditions including a temperature of from about 300°C to about 700°C, a pressure of from about 0.1 atmosphere to about 10 atmospheres and weight hourly space velocity of from about 0.1 hr^{-1} to about 20 hr^{-1} ; converting paraffins to aromatics with reaction conditions including from

USSN 10/625,322
Docket No. 2003B067

about 300°C to about 700°C, a pressure of from about 0.1 atmosphere to about 60 atmospheres and weight hourly space velocity of from about 0.5 hr⁻¹ to about 400 hr⁻¹ and a hydrogen/hydrocarbon mole ratio of from about 0 to about 20; converting olefins to aromatics, e.g., benzene, toluene and xylene, with reaction conditions including a temperature from about 100°C to about 700°C, a pressure of from about 0.1 atmosphere to about 60 atmospheres, weight hourly space velocity of from about 0.5 hr⁻¹ to about 400 hr⁻¹, and a hydrogen/hydrocarbon mole ratio of from about 0 to about 20; converting alcohols, e.g., methanol, or ethers, e.g., dimethylether, or mixtures thereof to hydrocarbons, including olefins and/or aromatics with reaction conditions including a temperature from about 275°C to about 600°C, a pressure of from about 0.5 atmosphere to about 50 atmospheres, weight hourly space velocity of from about 0.5 hr⁻¹ to about 100 hr⁻¹; isomerizing xylene feedstock components with reaction conditions including a temperature from about 230°C to about 510°C, a pressure of from about 3 atmosphere to about 35 atmospheres, weight hourly space velocity of from about 0.1 hr⁻¹ to about 200 hr⁻¹, and a hydrogen/hydrocarbon mole ratio of from about 0 to about 100; disproportionating toluene with reaction conditions including a temperature from about 200°C to about 760°C, a pressure of from about atmospheric to about 60 atmospheres, weight hourly space velocity of from about 0.08 hr⁻¹ to about 20 hr⁻¹; alkylating aromatic hydrocarbons, e.g., benzene and alkylbenzenes in the presence of an alkylating agent, e.g., olefins, formaldehyde, alkyl halides and alcohols, with reaction conditions including a temperature from about 250°C to about 500°C, a pressure of from about atmospheric to about 200 atmospheres, weight hourly space velocity of from about 2 hr⁻¹ to about 2000 hr⁻¹, and an aromatic hydrocarbon/alkylating agent mole ratio of from about 1/1 to about 20/1; and transalkylating aromatic hydrocarbons in the presence of polyalkylaromatic hydrocarbons with reaction conditions including a temperature from about 340°C to about 500°C, a pressure of from about atmospheric to about 200 atmospheres, weight hourly space velocity of from about 10 hr⁻¹ to about 1000 hr⁻¹, and an aromatic hydrocarbon/polyalkylaromatic hydrocarbon mole ratio

USSN 10/625,322
Docket No. 2003B067

of from about 1/1 to about 16/1. Additional conditions for using selectivated catalysts are set out in U.S. Patent No. 5,455,213 to Chang et al.

Please replace paragraph [0043] with the following paragraph:

[0043] In general, therefore, catalytic conversion conditions over a catalyst comprising the modified zeolite prepared by the present method include a temperature from about 100°C to about 760°C, a pressure of from about 0.1 atmosphere to about 200 atmospheres, weight hourly space velocity of from about 0.08 hr⁻¹ to about 2000 hr⁻¹, and a hydrogen/organic, e.g., hydrocarbon compound, molar ratio of from about 0 to about 100.